

REMARKS

Applicant thanks the Examiner for the thorough examination of the application.

Status Of The Claims

Claims 1-7, 11, 13-16, 20-24 and 28-35 are now present in the application. Claims 1, 22, 30 and 31 are independent claims. By this Amendment, claims 1, 22, 30 and 31 are amended, and claims 32-35 are added. No new matter is involved.

Reconsideration of this Application, as amended, is respectfully requested.

Rejections Under 35 U.S.C. § 103

Claims 1, 2, 5-9, 11, 13, 15, 16, 20-22, 24 and 28-31 stand rejected under 35 U.S.C. §103(a) over U.S. Patent No. 5,771,110 to Hirano et. al. (Hirano) in view of U.S. Patent No. 6,133,145 to Chen (Chen). Claims 10, 17-19 and 25-27 stand rejected over Hirano and Chen as applied to claims 1, 7, 22 and 30 and further in view of U.S. Patent No. 5,968,847 to Ye et al. (Ye). Claims 3, 4, 14 and 23 stand rejected over Hirano and Chen and further in view of JP 361002368 to Muraguchi et al. (Muraguchi). These rejections are respectfully traversed.

Independent claim 1, as amended, positively recites a combination of features, including etching the treated portion of said metal layer to form a pixel electrode, wherein said depositing a metal layer on the passivation layer, forming a photoresist pattern, and treating the exposed portion of said metal layer are sequentially performed, wherein the step of etching the metal layer includes etching the metal layer with a composition of HBr plasma gas and Cl₂ plasma gas or with a composition of HBr plasma gas and CH₄ plasma gas.

Independent claim 22, as amended, positively recites a combination of features, including etching the uncovered portion of said metal layer with a second plasma to form a metal pattern, wherein said depositing a metal layer over a substrate, forming a mask on a surface of the metal layer, and exposing the uncovered portion of said metal layer are sequentially performed, wherein the second plasma includes a composition of HBr plasma gas and CH₄ plasma gas or a composition of HBr plasma gas and CL₂ plasma gas.

Independent claim 30 recites a combination of features, including etching the uncovered portion of said metal layer with at least one second gas to form a pixel electrode, wherein said depositing a metal layer on the passivation layer, forming a photoresist pattern, and exposing the uncovered portion of said metal layer are sequentially performed, wherein the second gas includes a composition of HBr plasma gas and Cl₂ plasma gas or a composition of HBr and CH₄ plasma gas.

Independent claim 31 recites a combination of features, including etching the uncovered portion of said metal layer with at least one second gas to form a pixel electrode, wherein said depositing a metal layer on the passivation layer, forming a photoresist pattern, and exposing the uncovered portion of said metal layer are sequentially performed, wherein the second gas includes a composition of HBr plasma gas and Cl₂ plasma gas or a composition of HBr plasma gas and CH₄ plasma gas.

Applicant respectfully submits that the two references applied in this rejection teach away from being combined, as suggested, for a number of reasons.

A reference may be said to teach away “when a person of ordinary skill, upon reading the reference, would be discouraged from following the path set out in the reference, or would be led

in a direction divergent from the path that was taken by the applicant . . . [or] if it suggests that the line of development flowing from the reference's disclosure is unlikely to be productive of the result sought by the applicant." *In re Gurley*, 27 F.3d 551, 553, 31 USPQ2d 1130, 1131 (Fed. Cir. 1994). If when combined, the references "would produce a seemingly inoperative device," then they teach away from their combination. *In re Sponnoble*, 405 F.2d 578, 587, 160 USPQ 237, 244 (CCPA 1969); *see also* *In re Gordon*, 733 F.2d 900, 902, 221 USPQ 1125, 1127 (Fed. Cir. 1984) (finding no suggestion to modify a prior art device where the modification would render the device inoperable for its intended purpose).

Hirano, the primary reference used in the rejection, is directed to forming a pixel electrode 16 on a thin film transistor switched LCD device, whereas the multiple step plasma induced etching (PIE) technique of Chen, the secondary reference used in this rejection, is directed only to forming metal interconnects. Chen contains no disclosure whatsoever of using its multiple step plasma induced etching to forming an entire pixel electrode.

The rejection asserts that one of ordinary skill in the art would use Chen's multiple step plasma induced etching step to make Hirano's electrode. However, Applicant respectfully submits that one of ordinary skill in the art would not have such an incentive for the following reasons.

Firstly, Hirano clearly discloses, in col. 12, lines 54-60, that it uses a reactive ion etch (RIE) that does clearly does not employ, or need to employ, Chen's multiple step plasma induced etch (PIE) technique. Hirano's RIE technique works just fine to make its large pixel electrode.

Secondly, the Office Action provides no objective factual evidence that one of ordinary skill in the art would have been properly motivated to apply Chen's narrow interconnect PIE

process, which is specifically directed only to fabricating metal interconnect structures having widths of from 0.2 micron to 0.5 microns wide (col. 3, lines 22-25), to make Hirano's pixel electrodes, where Hirano discloses that its pixel pitch is 50 microns to 150 microns (col. 6, lines 23-29). Hirano's relatively huge pixel electrodes simply do not employ the decreased photoresist thicknesses that occur in Chen's relatively tiny interconnect structures, so there is no incentive for one of ordinary skill in the art to use Chen's process for achieving relatively high etch selectivity.

The rejection is not based on a reasonable evaluation of the significant differences of these two applied references, but is merely based on hindsight reconstruction of Applicant's claimed invention using Applicant's disclosure as a guide to combine Hirano and Chen in a way that the references themselves teach away from doing.

Additionally, neither Chen nor Hirano does anything to speed up the etch rate – a claimed feature of the invention. In this regard, reference is made to col. 1, lines 32, ff. of Chen, which state that prior to the metal etch, Chen provides a plasma treatment of the photoresist shape that slows the removal rate of the photoresist shape, while maintaining the desired removal rate of the metal. In other words, the metal etch rate is not changed, which means that the metal etch rate is not increased. So, no matter how these disparate references are combined, they cannot possibly result in, suggest, or otherwise render obvious, the claimed invention.

Moreover, the claims, as amended, recite specific ratios which are neither disclosed nor suggested by the applied art, including the tertiary references of Ye and Muraguchi.

As a result, one having ordinary skill in the art would not be motivated by the teachings of Hirano and Chen to produce the invention of independent claims 1, 22, 30 and 31. A *prima facie* case of obviousness has not been made. Claims depending upon claims 1, 22, 30 and 31 are patentable for at least the above reasons.

Reconsideration and withdrawal of these rejections are respectfully requested.

New Claims

Claims 32-35 are added. These claims depend from claims 1, 22, 30 and 31, respectively and patentably define over the applied art for at least these reasons. Additionally, these new claims recite features that further define over the applied art. Accordingly, Applicant respectfully submits that claims 32-35 are in condition for allowance.

Conclusion

Applicant considers all of the Examiner's comments to have been addressed and all of the Examiner's rejections overcome, thereby placing all claims pending in the present Application in condition for allowance. Accordingly, a Notice of Allowability is solicited in earnest.

Should there be any outstanding matters that need to be resolved in the present application, the Examiner is respectfully requested to contact Robert J. Webster, Reg. No. 46,472, at the telephone number of the undersigned below, to conduct an interview in an effort to expedite prosecution in connection with the present application.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37 C.F.R. §§ 1.16 or 1.17; particularly, extension of time fees.

Respectfully submitted,

Dated: January 12, 2009

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